Lateral Autonomous Performance Maximization of Tactical Unmanned Aerial Vehicles by Integrated Passive and Active Morphing

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***Abstract*— In this conference article, combined passive and active morphing approach is applied on tactical unmanned aerial vehicles (TUAVs) for autonomous flight performance maximization. For this intention lateral dynamic modeling of TUAVs manufactured in Erciyes University, Faculty of Aeronautics and Astronautics, Model Aircraft Laboratory is investigated in order to obtain lateral state-space model and a simulation model. Our manufactured TUAV is named as ZANKA-III which has weight of 50 kg, range of around 3000 km, endurance of around 28 hour, and ceiling altitude of around 12500 m. Von-Karman turbulence modeling is applied in order to capture atmospheric turbulence in lateral simulation environment. A stochastic optimization method called as simultaneous perturbation stochastic approximation (i.e. SPSA) is used in order to get optimum dimensions morphing parameters (i.e. extension ratios of wingspan and tailspan, assembly positions of wing and tailplane to fuselage).**

***Index Terms*— Tactical Unmanned Aerial Vehicles (TUAVs), Lateral Autonomous Flight, Lateral Performance, Morphing, Stochastic Optimization.**